September 7, 1982

CD82 -5 (LDV, LDT)

Dear Manufacturer:

Subject: Transmittal of Four Shift Indicator Light (SIL) Case Summaries and
          Announcement of a Workshop Regarding Needed Policy Standardization
          for SIL's.

In response to questions at the July 21, 1982 EPA/Industry meeting regarding
EPA's policy on SIL's, I indicated we would hold a workshop to review the
case-by-case decisions we have made to date and to discuss policy alternatives
for the future. The workshop will be held at 1;00 p.m. in the MVEL conference
room following the EPA/Industry Meetlng on September 15, 1982. The SIL issue
is complex and significantly impacts the fuel economy labeling and manufac-
turer's average fuel economy programs. Therefore, final policy setting
guidance will likely be in the form of an advisory circular which will require
review by EPA management and the Office of Management and Budget. It is
possible we could conclude that revision to the fuel economy regulations are
necessary. The workshop is intended to expedite our decision process by
providing early public and industry involvement. We request comments
regarding the SIL issue in either written or oral form. Written comments may
be provided at the workshop or by October 15, 1982. We will tape record the
workshop so that we can refer to oral comments later, however, since this is
an informal workshop there will be no typed transcript of the tapes. You are
welcome to tape record the meeting also.

I am enclosing a workshop agenda and draft internal documents that reflect our
initial efforts concerning this issue. Enclosure I is the agenda, Enclosure
II provides case studies of SIL labeling approaches we have accepted to date,
and Enclosure III outlines the policy alternatives we are considering. The
alternatives and discussion of advantages and disadvantages contained in the
latter document are not considered to be a conclusive treatment of the sub-
ject. We expect additional issues and solutions to surface both as a result
of the workshop and as our experience with 1983 model year SIL applications
are analyzed. Therefore, your input will be considered in the final policy
documents. Please bring copies of the enclosures to the workshop since only a
few extra copies will be available.

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Should you have questions concerning this matter before the workshop, please contact me or your certification team representative.

Sincerely yours,

Robert E. Maxwell, Director
Certification Division
Office of Mobile Sources

Enclosures

Enclosure I
Agenda
Shift Indicator Light (SIL) Workshop
September 15, 1982
1:00 p.m.

A.   Case Summaries for 1982/83 Model Year

     -Presentation by EPA: Case summaries.

     -Questions and answers.

B.   Alternatives for Future Policy

     -Presentation by EPA: Alternatives for future policy.

     -Presentations by any participants who have prepared statements or
       comments.

     -Open discussion, additional comments.

C.   Alternatives for Labeling Model Types Containing both SIL and Non-SIL
     Vehicles

     -Presentation by EPA.

     -Discussion

Enclosure II

   Summary of Survey Methods

Manufacturer 'A' 1983 Model Year

SIL Usage: 2 LDV and 1 LDT displacements, gasoline only

Approach;   Mini-survey of about 200 manufacturer A employees with
            smallest displacement lease vehicles followed up by a survey
            of actual owners of all three displacement vehicles.

Major Features:

-Official fuel economies (FE's) are based on testing vehicles at
  15-25-40 mph shift speeds and in accordance with the SIL and adding a
  percentage of this improvement to the 15-25-40 mph shift speed FE as
  follows:
          Equation and Where: information stored as CD8205_1.PCX

-The B percentage is based on responses to the question, Did you use
  the shift light ?   usually used,   usually did not
  use.

-Participants were asked to record fuel purchases and a second
  population of 766 drivers without SIL's were also asked to record their
  purchases. The actual fuel economy of the survey subjects was required
  to show an SIL FE improvement that was statistically and practically
  significant.

-The label values would be revised if the full followup survey showed
  that a one mpg lower unrounded label value would result.

                  Manufacturer 'B' Honda 1983 Model Year

SIL Usage; l displacement LDV gasoline only

Approach;   Pilot production of several thousand 1982 model year SIL
            equipped vehicles followed by a survey of recorded fuel
            purchases of both SIL and non-SIL vehicles.

Major Features; Official fuel economy is based on 15-25-40 mph shift
speed FE results plus the adjusted in-use FE improvement as follows:

Equation and Where: information stored as CD8205_2.PCX

-The fuel economy improvement was also measured on the dynamometer. The
  lower of the two FE improvements is used as the official FE result.

Manufacturer 'C' 1982 and 1983 Model Year

SIL Usage; All manual transmission gasoline/diesel.
1982 Approach; In-use survey of 1981 model year pilot production of SIL
                equipped diesels. An improvement claim was advertised
                based on FTC guidelines.

Major Features: Official FE's were based on a percentage of the FE
                improvement of SIL shifted vehicles over vehicles shifted
                at 15-25-40 mph shift speeds. An average improvement
                percentage was calculated for gasoline and diesel engines
                separately as follows:

Equation and where: information stored as CD8205_3.PCX

-The 'B' factor was the percentage of diesel owners who either always
  used or usually used their SIL.   Never used was a third choice.
  Partial credit was given for usually used responses.

-Owners were asked to keep a journal of fuel purchases. A comparison
  was made between drivers who always used or usually used and those
  who never used.

1983 Approach: Manufacturer 'C' will carryover some label value improvements from 1982 model year. Followup customer surveys will be conducted to verify 1982 model year carryover values. The survey will compare fuel purchase records of SIL and non-SIL owners according to the method used by manufacturer 'B'. Diesel, gasoline, LDV's, LDT's, and certain models will be considered separately. Relabeling will be required if the 1983 model year survey results fail to confirm the label values.

<center>Manufacturer 'D' 1983 Model Year</center>

SIL Usage;   1 LDV gasoline

Approach: The results of SIL shift speed tests will be harmonically averaged with the results of 15-25-40 mph shift speed results. A followup survey similar to manufacturer 'B' will verify the label values. Relabeling will be required if the owner survey shows significantly less than 50% of the dynamometer improvement.

Features;   The 50 percent credit was based on an engineering evaluation which substantiated that the design was equivalent to a similar design for which usage factor data existed.

<center>Enclosure III</center>

<center>Briefing Materials for SIL Workshop</center>

I. Part I –Alternatives Under Consideration for Future SIL Policy

   A. Allow Full FE Credit
       Features

          Test only at SIL shift speeds.

          Label statement or disclaimer (optional), for example FE measured assumes continuous use of the shift indicator light.

          Require discount of CAFE FE to reflect real world based on extensive survey or give no CAFE credit at manufacturers option (optional).

       Advantages

          Easy policy to adopt.

          Gives FE credit and encourages use of the device.

No surveys or multiple testing.

Minimizes EPA workload.

Disadvantages

Creates customer confusion since label values are not directly comparable. Would complicate Gas Mileage Guide. The statement would probably have to apply to advertising as well as labels.

Overstates FE benefit in FE label and CAFE (unless the optional CAFE feature is chosen).

Does not equitably give credit for the quality of the design. This could be partially overcome by doing a technical evaluation to qualify designs.

Contributes to in-use shortfall.

With optional CAFE feature there could be a regulatory conflict. The regulations require CAFE to be based, in part, on the FE label data.

B. Require a Survey to Measure the Actual SIL FE Improvement

Features

-FE may be directly measured from owner fuel purchase logs.

-SIL and control group samples are required.

-Statistical correction for measurement error can be applied to improve confidence, lower potential in-use shortfall.

Advantages

-Applicable to some other FE devices as well as SIL's.

-FE benefit is based on real world FE data.

-Vehicles do not need to be tested according to SIL shift speeds (except initially to demonstrate emissions effects and to establish limits on improvement).
-Can be technically defended as a correct approach.

Disadvantages

-FE benefit measured in-use may be suspect because:

  --Product mix will confuse result.

> --Few responses in the control group (most owners use the light)
> unless a separate group of vehicles without SIL's is surveyed.
>
> --Other factors affecting FE more than the SIL may confound the
> results e.g., location, weather, route, load, driver.

-EPA workload is increased by use of analytical data. Paperwork is
  increased.

-First year representative vehicles may not be readily available.

-Product mix may contribute to high variance of result.

C. Require a survey to measure usage rates.

Features

-Customer surveys to determine usage rate.

-Partial FE credit.

-Adjustment for measurement error.

-Individual device evaluation.

Advantages

-Manufacturers get deserved credit.

-FE credit is discounted to reflect real world usage.

-Encourages adoption of the device.

-Contributes less to in-use shortfall than allowing total credit.

  Only reasonable devices receive credit.

Disadvantages

-Accuracy of survey results is questionable since owner opinion is
  asked for.

-Amount of usage may not be related to actual FE benefits.

-Surveys are expensive considering their inaccuracies (see Attachment

III).

      -Analytical data must be used for every car.

D.   Establish a Standard Correction Factor

     Features

     -Applies to all qualified SIL's.

     -Based on various types of 1983 model year or later surveys.

     -Applies to standard shift procedure test results (15-25-40 mph).

     -Gives some percent improvement over the 15-25-40 mph results.

     Advantages

     -Eliminates surveys after first or second year.

     -FE credit is deflated to account for real world usage.

     -Some credit is given for labels and CAFE.

     -Benefit is based on data, not arbitrary.

     Disadvantages

     -Credit is not proportional to SIL design and calibration and vehicle
       type/engine.

     -Very little data may be available for several years.

     -Requires surveys for one or two years.

     -With a safety factor it would be lower than some already approved so
       may meet with industry resistance.

     -Requires analytical data entry.

E.   Harmonically Average Data

     -Each vehicle tested twice.

     -Data harmonically averaged--results in slightly less than 50 percent
       of dynamometer improvement.

     Advantages

-No survey required.

-Gives a FE benefit for labels and CAFE.

-Treats manufacturers equitably.

-Encourages SIL's.

-Simple to implement.

Disadvantages

-Credit is not proportional to device/vehicle/engine.

-May meet with manufacturer resistance due to lower credit, higher
 testing than other approaches.

-Requires dual testing of each applicable test vehicle.

-Could result in higher credit than is deserved for some designs.

F.   Allow Separate Labeling or Multiple Label Values

     Features

     -All EPA label and CAFE calculations based on 15-25-40 mph shift
      speeds or an alternative schedule. Manufacturer may use labels
      other than EPA label if he uses FTP tests and clearly identifies
      differences from EPA number. Estimated mpg must have prominence.
      (Option A)

-EPA label has second value for SIL (Option B).

-EPA label has a statement of potential improvement if owner uses SIL
  (Option C).

Advantages

-EPA becomes removed from shift speed advertising issues (Option A
  only).

-Allows manufacturer to advertise FE benefits of SIL.

-Policy may be applicable to other FE devices e.g., switched
  automatic transmission, stop/start devices.

-Cost-effective.

-In-use shortfall of estimated mpg not affected.

Disadvantages

-Multiple labeling or multiple label values would increase customer
  confusion.

-Potential real world improvements and benefits will not be recorded
  in official label value. Manufacturers may be discouraged from
  installing the devices.

-Manufacturers will not get credit for using FE improvement devices
  in CAFE calculations.

-Dual testing required of manufacturer and EPA (if EPA label values
  used).

-Regulation change might be required to provide for dual EPA labels.

        Part II -FE Credit Options Arranged by Decreasing Advertising Value

1. Full label credit (as measured on FTP).

2. Full label credit with disclaimer on label.

3. Credit proportional to estimated usage.

    A. Actual measured FE improvement in-use (survey).

    B. Percentage of people who say they use it (survey).

    C. Percentage of people who use it times the percentage of time they use
        it or simply percentage use (survey).

    D. Standard correction factor.

4. Harmonically average the FTP results of both types of testing (SIL and
normal shifting or use some other standard improvement).

5. Allow dual label values, SIL value with a disclaimer.

6. Measure the percentage FTP improvement and allow manufacturers to advertise

an EPA endorsed FE improvement. No label credit. No CAFE credit.

7. No FE credit.

Part III -Methods of Providing SIL Populations and Control Groups

1. Build a pilot fleet of SIL vehicles (as two manufacturers have done).

2. Survey initial production if a control group is available.

3. Survey initial production. If a control group is not available find a worst-case control group, or

4. Survey owners to locate owners who do not use the SIL, or

5. Make a control group by having SIL's a delete option for a period of time, or

6. Randomly select customers to participate in a survey with their SIL disconnected for one month and provide an incentive.

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Part V -In-Use Fuel Economy Improvement Calculation

Equation and where: information stored as CD8205_4.PCX

-With C = 1.645, we have 95 percent confidence that the improvement is greater than the LCL calculated above.

-Manufacturer chooses Nl, N2 after estimating Sl and S2 to minimize the correction or achieve a cost-effective sample size.

$$\bar{X}_1 = 30, \bar{X}_2 = 27.5, S_1^2 = S_2^2 = 25$$

$$N_1 = N_2 = 200 \ (400 \ total)$$
$$C = 1.645$$

$$LCL = 30 - 27.5 - 1.645 \sqrt{\frac{25}{200} + \frac{25}{200}}$$

$$= 1.6775 = 1.7 \ mpg$$

-FE improvement is greater than 1.7 mpg with 95 percent confidence.

 -If survey vehicles are sufficiently similar to production vehicles, this
  result can be added directly to test vehicle city fuel economy results.

-If survey vehicles differ substantially from production vehicles, then the
  mpg improvement must be converted to a percent improvement.